

Transportation

1 TARGETING CHAPMAN'S ALTERNATIVE TRANSPORTATION IMPROVEMENTS

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1.1 INTRODUCTION

Chapman University is a commuter campus with only 32% of students living on campus and the majority 68% living off campus. While 68% of students live off campus, little is understood about these students' commutes, such as how many miles away they live, what mode of transportation they use to get to campus, and why they choose their mode of transportation? Developing knowledge of student distribution off campus and student transportation preferences is directly related to the university's ability to provide support for student transportation needs. Using this knowledge, the university will be able to make informed recommendations for the most successful alternative transportation methods that will reduce parking issues on campus and make a more enjoyable commute experience for students.

Spatial analyses of student residential address data show that over 5000 students live within a reasonable active commute distance from campus. Analyses of existing sustainable transportation infrastructure show many bus routes, but infrequent utilization due to untimely and infrequent stops. Overall, this lack of frequency is a key failure in existing infrastructure as student surveys showed that convenience was the main factor in student transportation decisions. There is a demographic of students within a reasonable distance from campus that could use active transportation if the best programs were incentivized in an effort to get these students to leave their cars at home. Reducing single passenger vehicle trips to campus would decrease Chapman's carbon emissions and reduce the parking issues many face every day. However, the solutions must be as, or more convenient than driving solo.

1.2 HISTORY AT CHAPMAN

1.2.1 Demographics

Sixty-eight percent of Chapman students are identified as 'commuters,' meaning 'not living in Chapman owned housing,' and 32% as 'residents.' Of these residents, 88% students live in residential halls across the street from the main campus and 12% in Panther Village housing located two miles from campus and serviced by the Panther Shuttle. For commuter students, there has been very little historic data on the distribution of students once they move off campus.

1.2.2 Existing Programs

Efforts have been made on behalf of the Dean of Student's office to collect more comprehensive residential address data in recent years in response growing concerns about the relationship between students and other Orange residents. Also, in response to these neighborhood relation issues, Chapman has identified adding new student residences to its campus as a priority for future development. Currently, there is one student residence hall in the earliest stages of development being planned to go online in 2020 on a lot Chapman owns near the Dodge College of Film and Media Arts. The layouts of these rooms are yet to be decided so it is still unclear how

many students will be housed there, but according to the Dean of Students it is not likely to exceed 500.

Adding layers to the neighborhood relationship issue, concerns about student parking habits have been raised by Orange residents to the university. Orange residents do not want students filling street parking surrounding the university. In response, the city has created a permit parking system for many residential streets within a mile radius of the university, and limited the hours a car can be parked in commercial areas. Additionally, the university switched to an ‘opt out’ parking permit system, in which, every student is automatically billed for a parking permit at the beginning of the semester, but has the opportunity to ‘opt out’ if they choose. The hope is that, if students are automatically billed, they are more likely to keep the parking permit and use on campus parking rather than street parking. While this is an effective incentive to move student parking on campus, it is contradictory to sustainability goals as it simultaneously incentivizes all students to bring a car to campus since they already pay for a permit.

Chapman, in addition to providing student residences, also provides housing for some staff and faculty members. The university purchases homes in the historical neighborhood surrounding Chapman, renovates them, and rents them to faculty and staff. Faculty and staff access this program either by entering a waiting list, or having a home worked into their contract when they begin to work at Chapman. This program is intended to make Chapman a more desirable place for faculty to work since they have the opportunity to reduce their commute for little to no cost. It also has the unintended, but beneficial, consequence of reducing scope III carbon emissions as employees commute less to campus.

In addition to these programs, Chapman has a set of programs specifically geared toward developing more sustainable transportation habits for students, staff, and faculty. One of the best examples of this is the bike incentive program in which, in return for giving up your parking permit for two years, you can receive \$350 toward a local bike shop of your choice for bike maintenance and accessories. For all bikers, there are bike maintenance stations located near the most utilized bike racks on campus with tools and tips on how to fix common bike issues. Additionally, Human Resources offers discounted Metrolink and OCTA passes to the Chapman community. Students who live in the Panther Village apartments have the opportunity to use the Panther Village shuttle to bus them to and from campus. This shuttle service also runs between main campus and further locations such as the Facilities Management building for other students, faculty, and staff to use.

Chapman acknowledges that, while these subsidies and programs can be effective for most days and for getting to and from campus, there is comfort associated with having a car to use occasionally or in case of an emergency. To address this, Chapman has a Zip Car program with four cars. Overall, this program is cheaper than what one would pay on car maintenance, insurance, and gas, so you can save money while maintaining occasional access to a car. Furthermore, Chapman offers the option of a carpool parking permit in which a single permit and transponder are issued to a group of individuals that regularly carpool to campus. This system allows for multiple drivers to drive in the carpool but ensures at least two people are coming to campus in each passenger vehicle using one and grants users the benefit of parking in more favorable spots.

For infrequent or local emergency uses, Chapman offers the Safe Ride program through its Public Safety department. This service provides rides for students in any combination of pick-up location and destination within a one-mile radius of campus. Safe Ride is intended to provide a

secure means of transportation for students if they need to get somewhere late at night as opposed to walking or biking.

1.2.3 Areas for Improvement

While Chapman does have some options for more sustainable transportation alternatives, there are many ways to improve the programs themselves as well as the impact of the programs. Firstly, while some options exist, they are rarely driven by the purpose of sustainability and most commonly steered by impacted parking. While this sometimes creates alternative and more sustainable methods for getting to campus such as the public transit discounts and carpool permits, it also sometimes creates less productive incentives for sustainability such as the opt-out parking permit system that incentivizes everyone to obtain a parking permit

Additionally, little effort and time are put into the marketing of existing programs. Most information is either given out during optional orientation programming. Beyond orientation, information is passively offered on the HR website.

1.3 CURRENT STATUS

1.3.1 Existing Program Analysis

According to student survey data, most students do not regularly use the offered sustainable transportation incentives. Of the students surveyed, the vast majority of over 50% of off campus students indicated driving as their primary transportation method (**Figure 1.1**).

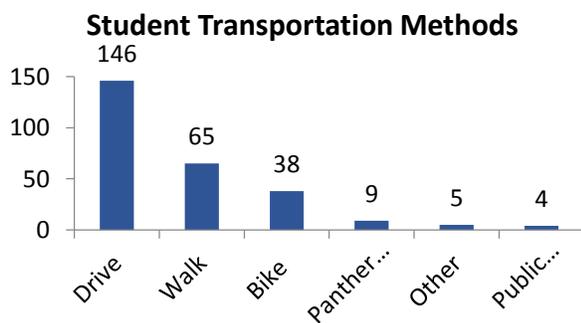


Figure 1.1 - Off campus student responses to the question “What is the primary method of transportation?”

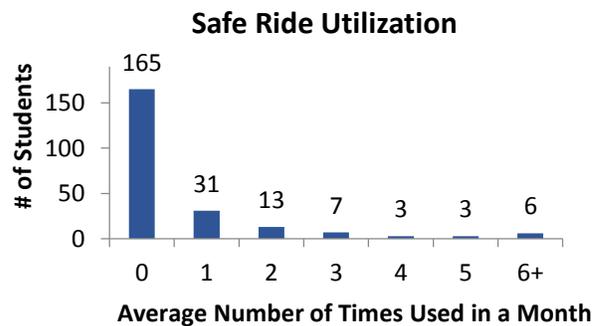


Figure 1.2 - Off campus student response to the question “How many times per month do you use the Safe Ride Service?”

Furthermore, the safe ride service is not widely or frequently utilized by off campus students. Of the students surveyed, the majority do not use the service at all in an average month (**Figure 1.2**).

1.4 ANALYSIS

1.4.1 Data Collection

Student preference data and data concerning student transportation habits were collected in a survey distributed to the student body. Questions targeted how students regularly use transportation options as they currently are and what preferences make them choose to do so. Chapman University actively collects student residence data over the PeopleSoft data management application, colloquially known as “my.chapman.” When students log in to access other tools such as registration tools and viewing transcripts, they are prompted to update their residential address. These addresses can be exported to excel and sorted by academic year and residence on or off campus.

Counties publish GIS data online for easy access across city departments and independent contractors and studies. Orange County Public Works publishes their data in a ‘GIS Cloud’ and offers information such as arterial street center lines, freeways, rail roads, cities, census tracts, and school districts. Similarly, the Orange County Transportation Authority (OCTA) offers a data download website with spatial data on bikeways, bus routes, bus tops, and Metrolink line, and Metrolink stops.

1.4.2 Student Preferences and Concerns

Understanding student preferences and concerns is integral to developing well-received programs. A survey distributed by Environmental Science and Policy majors collected feedback regarding sustainable transportation alternatives to target student priorities for development and optimal options and incentives for utilization.

It is useful to know what factors students consider when making transportation choices. Based on survey data shown in **Figure 1.3** the overwhelming majority of students decide how to commute to campus based on convenience across all methods of transportation. The second most popular reason students choose to drive is to save time and to walk is to save money. Overall, sustainability, health, and safety are not common factors students consider when deciding how to get to campus. Based on these responses, successful recommendations for transportation alternatives will target convenience, saving time, and saving money.

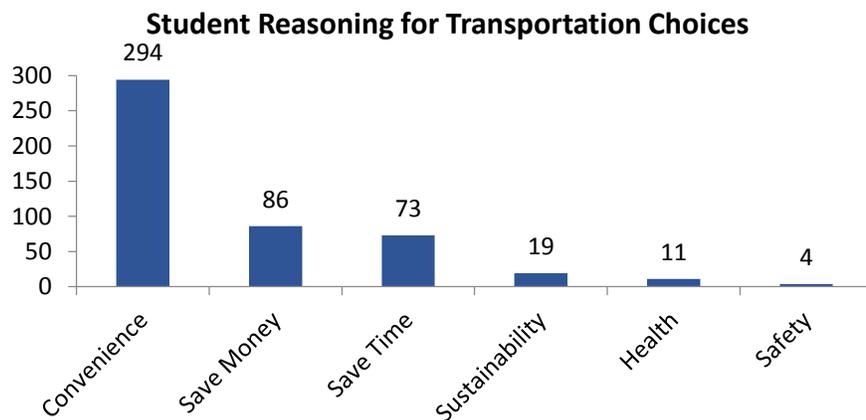


Figure 1.3 - Student responses to the question “What is the primary reason you choose this [transportation] method?”

The survey addressed both concerns with existing alternative transportation methods such as public transportation and biking as well as preferences for potentially recommended programs such as a Panther Shuttle program expansion or ride share program.

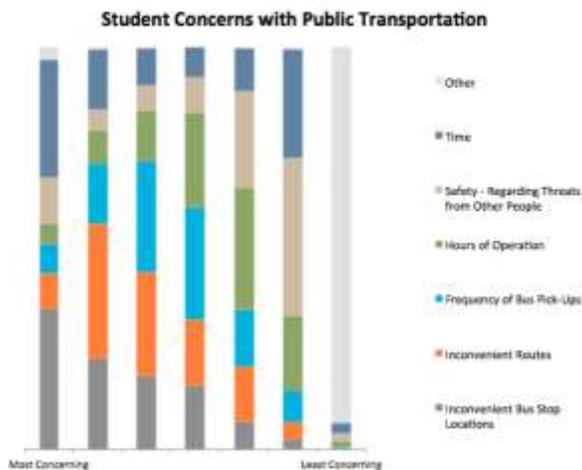


Figure 1.4 - Students were asked to rank concerns with using public transportation

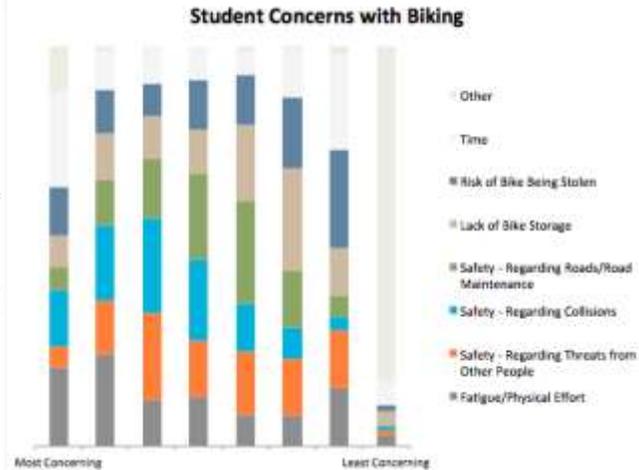


Figure 1.5 - Students were asked to rank concerns with biking to campus

Figure 1.4 shows that students’ primary concerns with public transportation are time and inconvenient bus stop locations. Close behind, students are unsatisfied with the routes offered by public transportation, next is the frequency of bus pick-ups. While some students identified safety regarding other passengers and hours of operation as concerns, they were generally ranked low on students’ level of concern. Another primary concern identified in the ‘other’ field was a lack of knowledge of how to operate public transportation or to find what routes were available.

Student concerns about biking were more varied than concerns about public transportation as seen in **Figure 1.5**. Overall, time and fatigue/physical effort trended toward the top of student concerns. Safety regarding threats from other people was fairly evenly dispersed throughout student concerns, and safety regarding road maintenance or collisions, lack of bike storage, and risk of bikes being stolen were of relatively low concern for students. Beyond these, students noted purchasing bike, biking in inclement weather, biking at night, and confusing laws concerning biking as reasons they are discouraged from biking.

Regarding potential recommended programs, a Chapman-specific ride share app would most likely convince students to leave their cars at their residences. The next most favorable options, in order of favorability, were improved local public transit options, improved bike lanes, and more easily available Zip car options. Increased time and destination options for carpools and bus services to grocery stores were relatively unlikely to convince students to leave their cars at their residence, even among the students who live on campus.

Increased panther shuttle or OCTA bus routes may require more thought and development to be successful. Surveyed students were asked to report the distance from their residence that a shuttle or bus would have to run and in what time increments in order to make it an option they would consider and were given the option to select N/A if they could not be convinced to utilize the method of transportation. For both Panther Shuttles and public transportation, over half of responding students indicated that they could not be convinced to use these methods. The vast majority of the remaining students selected the closest distance from their residence and shortest

time increment available. This is consistent with results shown in **Figure 1.4** indicating that student’s primary concerns with public transportation are time and bus stop locations.

1.4.3 Spatial Analysis

Some forms of sustainable infrastructure already exist around Chapman’s campus. Spatial analysis of existing infrastructure relative to campus is telling in the variety and availability of access offered by existing infrastructure as well as the county’s definitions of some forms of infrastructure. Examining bus routes and bus stops near campus shows that there are both North/South and East/West running routes within a maximum of one mile of each other in the area surrounding campus meaning that an individual’s walk to a walk in any direction would be at most half a mile (**Figure 1.6**). Furthermore, bus stops appear frequently meaning that the walk to a stop should not significantly increase walking distance for access. Additionally, looking into bike routes surrounding campus shows that Orange County uses a loose definition of ‘bike routes.’ Bike routes, in the way that Orange County classifies its data, does not necessitate the presence of a bike lane, but merely the ability to use the crossing signal from the roadway rather than the side walk.

Analysis of student residence data shows that there is a significant student audience for using active modes of transportation to get to campus. A buffer analysis shows that in 2017, 5587 of the just over 9000 students live within 5 miles from campus (**Figure 1.6**). A 5 mile commute at a leisurely pace would take individuals 30 minutes to get to campus. Of those 5587 students, 4011 live even closer within a 1-mile radius of campus. This would take 24 minutes to leisurely walk or 6 minutes to leisurely bike.

1.4.4 CO₂ Emissions

According to the EPA, the average car emits 411 grams of CO₂ per mile (2016). Assuming that all students live in the center of the buffer rings from **Figure 1.7** and travel to and from campus once per day five days per week, Chapman student commutes would emit 71.36 pounds of CO₂ every week if all students used personal vehicles to get to campus. Because survey data shows that most students do use personal vehicles to get to campus, encouraging students to use active modes of transport could significantly reduce the University’s carbon dioxide emissions.



Figure 1.6 - Existing alternative transportation infrastructure around Chapman University – enlarged version in appendix 1.9.1

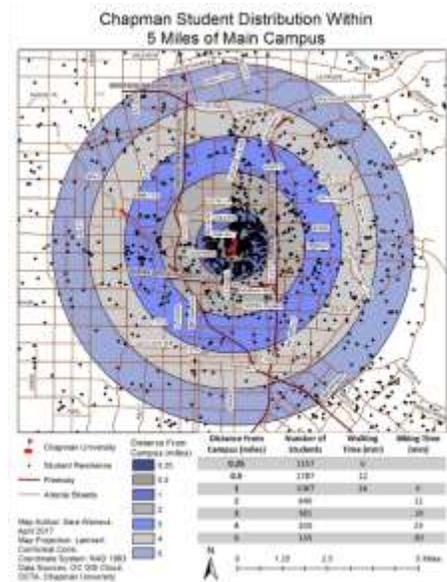


Figure 1.7 - Student residences within reasonable distance for active transport to campus – enlarged version in appendix 1.9.2

1.5 CONCLUSIONS

1.5.1 What is working well

Currently, students living on or near Chapman's campus have relatively widespread access to public transportation lines in a variety of directions. Beyond existing infrastructure, Chapman provides a variety of incentives to reduce single person vehicle commutes.

1.5.2 Areas for Improvement

Though students do not have to walk far to reach public transportation routes, they note that it is inconvenient and takes too long to be a viable means of transportation. This suggests that the primary issue with public transportation routes is not the spatial frequency of stops but the temporal frequency. Buses not running frequently enough would also speak to some of the primary concerns of students when selecting modes of transportation, which are time and convenience.

While bike routes appear somewhat frequent according to Orange County data, the quality of these bike routes could improve. Increasing the number of bike lanes and requiring an official bike lane to designate a bike route could improve the safety and ease of access for bicyclists.

Furthermore, marketing of existing incentives could be improved. The number of students living within a reasonable distance to utilize these resources compared to the high ratio of drivers to users of alternative transportation as well as the low utilization rate of these programs suggest a lack of awareness of incentives or the quality of the incentives.

1.6 RECOMMENDATIONS

Overall, student distribution data show that there is a significant audience of students that are reasonably able to utilize more sustainable methods of transportation to get to campus. Data on preferences and concerns suggest that the main factors preventing students from utilizing these more sustainable modes are time and convenience. Because of these factors, Chapman can effectively seek to lower its CO₂ emissions from student commutes by adopting programs that both decrease the convenience of driving to campus and increase incentive for using alternate modes of transport.

1.6.1 Low Effort Recommendations

Better and Targeted Marketing of Existing Incentives

Regardless of their originally intended purpose, Chapman offers an array of well-incentivized alternative transportation incentives. Though they are offered, they are severely underutilized due lack of awareness. Chapman can increase awareness first by centralizing all transportation incentives into one resource rather than having them spread between departments as they are now between HR, transportation, and sustainability. Furthermore, more effort can be put into pushing these programs in the beginning of the semester and just before the semester starts to build habits of using alternative transportation into students' daily routine. Lastly, just as Chapman uses student residential address data to target notices about noise ordinances and neighborhood relationship building programs, Chapman can utilize student residential address data to target market information about incentive programs appropriate for their distance from campus. For example, students living on campus would receive information about Zip Car services, students within 0-1 miles information about potential savings on parking permits, within 1-5 miles

information about the bike incentive program, within 3-5 miles information about public transit options, and over 5 miles information about ride share and carpool programs.

Develop a Guide to Public Transportation

Students identified confusion with how to use public transportation systems as a key factor in keeping them from trying this alternate mode of transportation. Developing a guide that uses main campus as a center point and provides public transit directions to popular student destinations such as grocery stores, the beach, Disneyland, and Los Angeles would reduce uncertainty about navigating transit systems. Additional information on how to search for more customizable routes and included information on Chapman's public transit systems would increase continued engagement.

1.6.2 Medium Effort Recommendations

Work with OCTA to Improve Options

OCTA ultimately aims to have the most useful transportation service for the most Orange County residents as practicably possible. As Chapman is only growing in the number of residents they bring to Orange County, OCTA should have an invested interest in providing for the University. Chapman can work with OCTA to better connect bus routes between campus, areas of high density off campus student housing, and popular student destinations. Furthermore, Chapman can advocate for OCTA to increase the frequency that buses run to make public transit a more realistic option for students.

Switch to an Opt-In Parking Permit System

Currently, students are automatically charged for a parking permit rather than being asked to decide whether they would like to purchase one. The opt-out system was originally designed to grant more students parking permits in the hope that it would keep students from parking on the streets and exacerbating neighborhood relationship issues. Unfortunately, this plan has been largely unsuccessful as un-permitted street parking is still consistently used and the system has contributed to the additional issue of increased traffic around the University.

Asking students to decide whether or not to purchase a parking permit will automatically prevent some students from obtaining a parking permit. These students will then have greater incentive to use alternate modes of transportation more frequently rather than relying on their personal vehicle.

Work with the City of Orange to Increase Bike Path Availability

Currently, most of the designated bike paths do not include official lanes. Increasing the availability of bike lanes would increase the safety of bikers and decrease the hassle associated with biking in Orange.

1.6.3 High Effort Recommendations

Further Develop the Panther Shuttle Service

The Panther Shuttle service provides a consistent mode of transport for Panther Village residents to and from campus. If this service were expanded to other high density student residential areas off campus such as the La Veta Grand apartment complex, Chapman could essential develop a miniature bus system for students to get to campus. This system would

decrease incentive to drive by removing the worry about parking and feel safer and more reliable to students.

Develop More Off-Campus Housing

Developing more student housing, even if a distance from campus, will provide more predictability for student distribution patterns. This predictability will allow Chapman to better plan for commutes by expanding services such as the Panther shuttle or expanding the Safe Ride radius of operation to include housing developments.

Increase Safe Ride Service

Increasing the number of drivers, hours, and radius of operation for the Safe Ride service would make the service a more viable ride share option for students. Currently, students are limited in the hours of operation, radius of operation, and time it will take for a driver to get to them, but further adding to this resource will increase its convenience of use and therefore increase the overall utilization and reliability.

1.6.4 Future areas of research

Over time, student's living distribution, needs, and apprehensions will change. Updates will be necessary about every 4 years, as the student body changes completely. Identifying a department on campus to update student residence reports regularly and determine new needs for student transportation and commutes will keep the system current.

Additionally, further analysis of student residence data may provide deeper clarity into under serviced areas of student residence. Creating a 'heat map' of student residences would show areas that it would be most useful to service with alternatives like a Panther Shuttle, van pool service, or additional bus route.

1.7 CONTACTS

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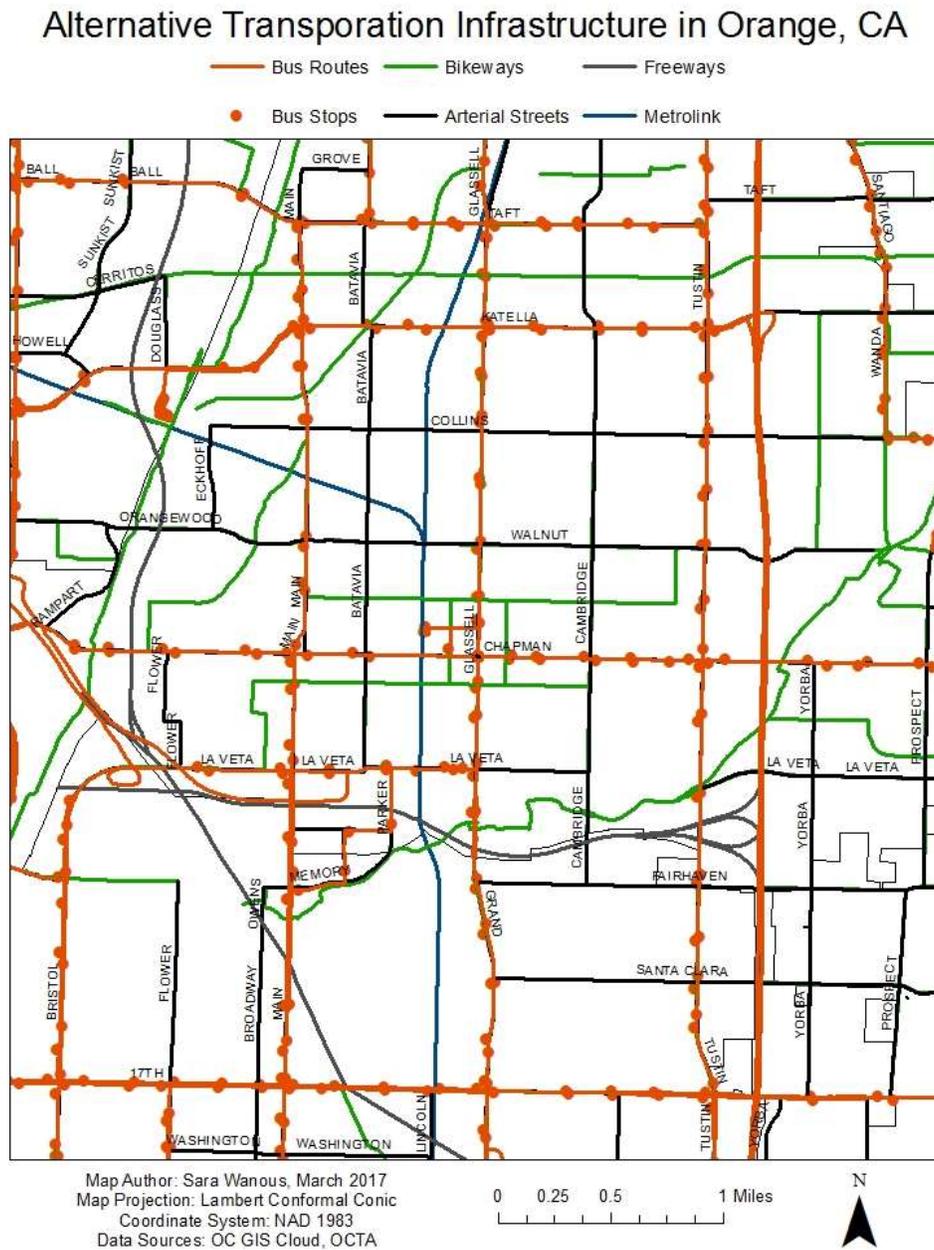
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1.9 APPENDIX

1.9.1 Appendix 1

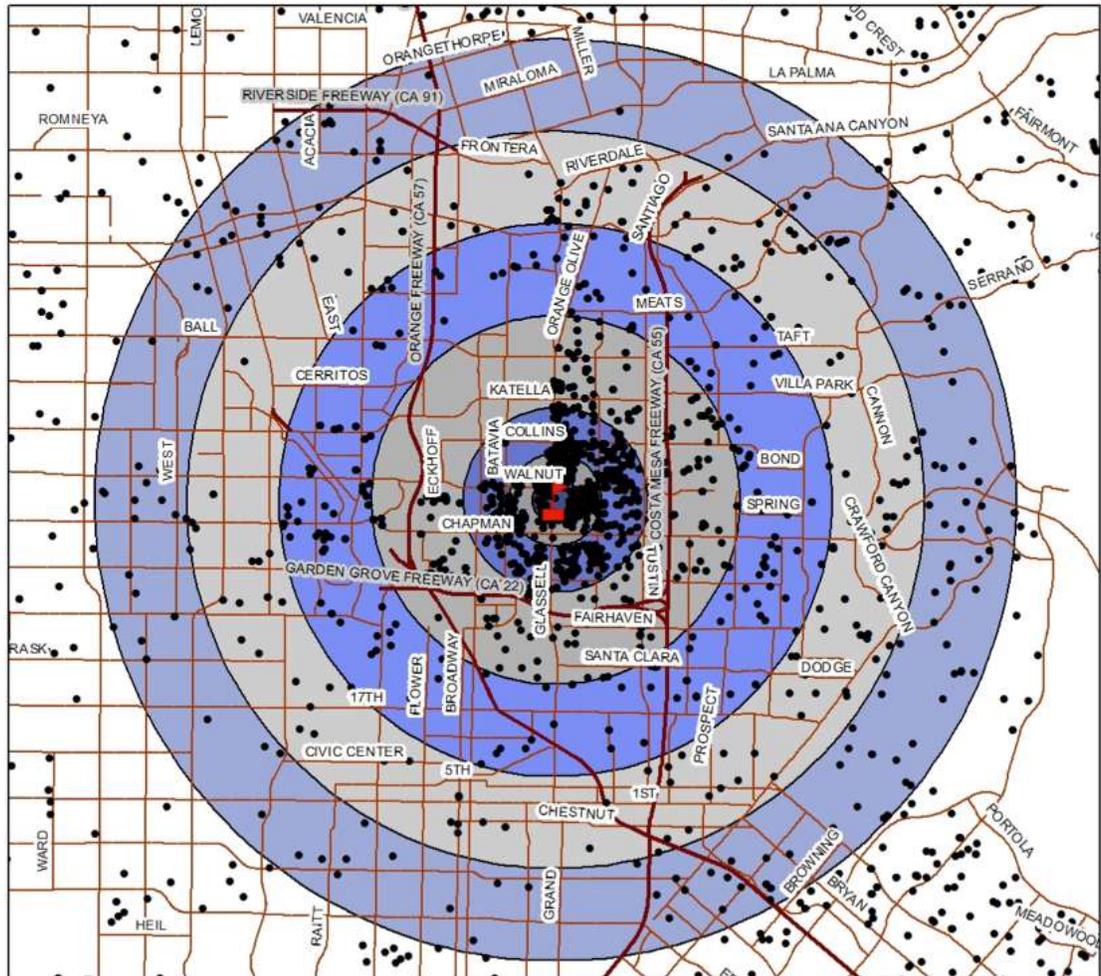
Figure 6 – Alternative Transportation Infrastructure in Orange, CA



1.9.2 Appendix 2

Figure 7 – Distribution of Student Residences around Chapman University

Chapman Student Distribution Within 5 Miles of Main Campus



Distance From Campus (miles)	Number of Students	Walking Time (min)	Biking Time (min)
0.25	1157	6	
0.5	1787	12	
1	1067	24	6
2	840		12
3	381		18
4	200		24
5	155		30

Map Author: Sara Wanous, April 2017
 Map Projection: Lambert Conformal Conic
 Coordinate System: NAD 1983
 Data Sources: OC GIS Cloud, OCTA, Chapman University